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PLAZOLITE, A NEW MINERAL¹

WILLIAM F. FOSHAG

U. S. National Museum

Included in some material collected by the writer near Riverside, California, were several specimens of vesuvianite associated with small colorless dodecahedrons. The latter proved to be distinct from any known species and the writer proposes the name plazolite from the greek *plazo*, to perplex, in allusion to the difficulty in interpreting its composition. The work detailed below was done in the mineralogical laboratory of the University of California and the writer is indebted to Prof. A. S. Eakle for his kindly interest and for his many valuable suggestions.

Occurrence and Genesis.—The mineral was found at the Commercial Quarry of the Riverside Portland Cement Co., at Crestmore, near Riverside, Calif., directly associated with green vesuvianite and an unknown, foliated white mineral, and in the same part of the quarry that has yielded riversideite, wilkeite, wollastonite, diopside, garnet, etc. The crystals of plazolite are imbedded in the foliated white mineral, and a massive form also occurs directly filling the space between the vesuvianite crystals.

The limestone composing the hill is intruded by a dike of fine-grained granodiorite. The genesis of the plazolite and associated minerals is directly connected with this intrusion. Small pegmatitic stringers leave the parent mass of the dike and cut across the garnet hornfels adjacent. The offshoots are mainly feldspar with some quartz, occasional tourmaline, and rare zircon. After the solidification of the pegmatite, hot magmatic waters penetrated the metamorphosed mass, altering such stable minerals as vesuvianite, kaolinizing the feldspar, and in many places leaching out the more soluble minerals leaving a skeletal residue of silica and iron oxides. It was at

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this stage that the wilkeite was altered, the zeolites developed in the pegmatites, and a large array of hydrous calcium silicates, most of them still unidentified, were formed. These include the riversideite and the plazolite.

Crystallography.—Plazolite crystallizes in small, clear rhombic dodecahedrons of the isometric system. No other forms were noted. The crystals reach a maximum size of 2 mm.

Physical Properties.—The mineral is brittle, has a conchoidal fracture, and shows no evidence of cleavage. Its density, determined with a pycnometer, is 3.129. Hardness, 6.5.

Optical Properties.—The mineral is colorless to light yellow. The luster is vitreous, almost adamantine. The refractive index as determined by the immersion method is 1.710. Some crystals show slight anomalous birefringence.

Chemical Composition.—The material selected for analysis was composed of clear, colorless, dodecahedrons free from adhering material. Analyses were made upon three different samples. Nos. I and II were made on the original lot collected; No. III upon some received later. In analysis I the presence of CO_2 was not suspected and the ignition loss only determined. In II and III the water was determined by Penfield's method and the CO_2 by difference between ignition loss and water content, since the amount of material was insufficient for a direct determination of CO_2 . The other constituents were determined in the ordinary manner. The mineral is easily soluble in hydrochloric acid.

	I	II	Molecular Ratios		III	Molecular Ratios	
SiO_2	24.13	23.85	.397	2.1	25.06	.417	1.8
Al_2O_3	23.66	22.77	.223	1.0	24.63	.241	1.0
CaO	40.22	40.13	.716	3.2	40.13	.716	2.9
MgO	0.12	—	—	—	Trace	—	—
H_2O	} 12.21 {	9.39	.521	2.4	9.04	.502	2.1
CO_2		3.41	.077	—	1.13	.025	—
Totals.	100.34	99.55	—	—	99.99	—	—

In the above ratios the CO_2 is calculated with the SiO_2 since the two apparently are contained in the mineral molecule. These ratios lead to the formula $3\text{CaO}.\text{Al}_2\text{O}_3.2(\text{SiO}_2, \text{CO}_2).2\text{H}_2\text{O}$.

Constitution and Relations.—A determination of the ignition loss at various temperatures gave:

	Percent.
110°.....	0.18
150°.....	0.21
Blast.....	12.80

The powdered mineral was tested with phenolphthalein but gave only a faint coloration. The gently ignited material gave a decided red color and also upon leaching a slight precipitate with ammonium oxalate. As will be seen from the analyses the water content is constant. The CO_2 is apparently an integral part of the mineral molecule. That CO_3 can replace SiO_3 is shown by the experiments of Lemberg,¹ who synthesized both carbonate and silicate-cancrinite. The ratio of the bases to the silica is very large. The only formula which will satisfy all the bases is an orthosilicate one in which the bases are present in some complex grouping. The mineral appears to be most nearly related to sodalite.

THE GOLDSCHMIDT TWO-CIRCLE METHOD. INTRODUCTION TO THE TRICLINIC SYSTEM

CHARLES PALACHE

Harvard University

THE GNOMONIC PROJECTION

Figures 38 and 39 show the gnomonic projections of the upper and lower ends respectively of the anorthite crystal discussed in the following paper by Professor Parsons, assuming that the same faces would be developed on the upper end as were found by measurement on the lower end. The two figures are similar, the differences being such as to be very puzzling unless the relations of the two are clearly in mind. The one may be obtained from the other by pricking the face-poles thru on to the back of the paper, and then turning the paper over in such a way that the right-and-left coordinate maintains its direction but with ends interchanged. Figure 38 is that which would be obtained by plotting the angles of the respective forms as given in the *Winkel Tabellen*.² In figure 39 the forms have the same ρ values and the same φ values but measured in the opposite sense; the latter is also true of the angle ν ; and the y and q

¹ *Z. Deut. Geol. Ges.*, 1885, 662.

² In the project thus made the direction-lines of faces in the prism zone would center at S, the projection center, and would not pass thru nodes of the network of face-poles of the terminal faces. By transferring the direction-lines by parallels thru O, the pole of the base, they become, as shown in the figure, diagonals of the network; and their zonal relations and symbols then become evident.

From figure 40 in which $r_0 = 1$ we derive the relations:

$$(1) x = x_0 + pp_0 \sin \nu \quad (2) y = y_0 + qq_0 + pp_0 \cos \nu$$

If $h = 1$ the similar relations hold:

$$(3) x' = x_0' + pp_0' \sin \nu \quad (4) y' = y_0' + qq_0' + pp_0' \cos \nu$$

$$(5) x' = \sin \varphi \tan \rho \quad (6) y' = \cos \varphi \tan \rho$$

Since φ and ρ for each face are known by measurement we can calculate x' and y' from equations 5 and 6; see table 3, page 192 of Parsons' paper for illustration. p and q are also known from the graphical determination; see figures 39 and 43.

We have therefore to calculate the five independent quantities: x_0' and $p_0' \sin \nu$ from equation 3 (Parsons, table 8); y_0' , q_0' and $p_0' \cos \nu$ from equation 4 (Parsons, table 9); an independent value of ν from the prisms (Parsons, table 10). These elements may be termed the *projection elements*. They are identical with those which may be determined graphically from the projection, this serving as a check on the calculations.

Preceding all these calculations, however, is the determination of the value v_0 , which is the mean value of the vertical-circle reading for the face 0∞ derived from all the measurements. This calculation, much more laborious in the triclinic system than in any of the others, where there is a symmetrical distribution of the faces about the vertical axis, is explained at length in Parsons' paper and illustrated in his tables 4, 5, 6 and 7.

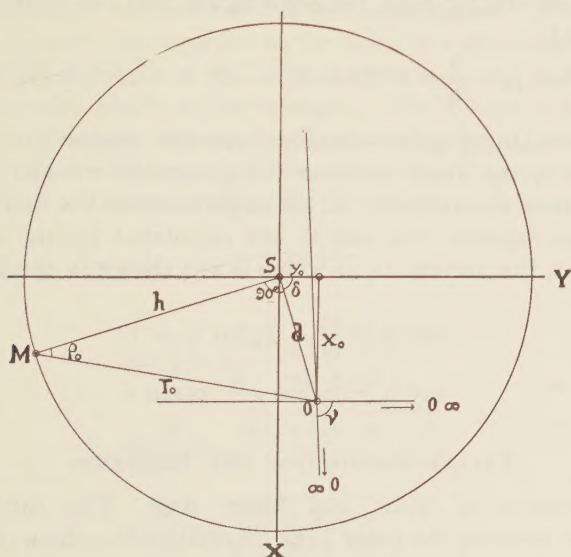


FIG. 41 (Palache).

CALCULATION OF POLAR ELEMENTS FROM PROJECTION ELEMENTS

Figure 41 shows with greater detail the central portion of figure 40. In it O is the projection of the base with rectilinear coördinates x_0 and y_0 , and polar coördinates δ and d . M is the angle-point of the line SO and the triangle SMO represents the relations at the crystal center of h , the normal to the projection plane, and r_0 , the normal to the base.

The projection-elements first calculated, p_0' , q_0' , x_0' , and y_0' , are measured in a plane where h is unity. The polar elements are to be measured in a parallel plane cutting r_0 at unity which means that each will be shorter in the proportion of $h : r_0$.

For example $p_0 = p_0' \cdot \frac{h}{r_0}$

From figure 41 it is evident that $\frac{h}{r_0} = \cos \rho_0$; but $\tan \rho_0 = \frac{x_0'}{\sin \delta}$ and $\tan \delta = \frac{x_0'}{y_0'}$. We can therefore calculate δ and ρ_0 and thus find $\cos \rho_0$.

$$\begin{aligned} \text{Therefore } p_0 &= p_0' \cos \rho_0 & x_0 &= x_0' \cos \rho_0 \\ q_0 &= q_0' \cos \rho_0 & y_0 &= y_0' \cos \rho_0 \end{aligned}$$

It is also evident from the same figure that the following relations hold:

$$\tan \rho_0 = \frac{d}{h} = d' \quad (h = 1) \quad d' = \sqrt{(x_0')^2 + (y_0')^2}$$

The remaining polar elements are the angles λ , μ , and ν . Of these ν , the angle between the pinacoids $\infty 0$ and 0∞ , has already been determined. λ , the angle between 0∞ and 0 , and μ , the angle between $\infty 0$ and 0 , are calculated by the following equations, the derivation of which is not shown in the figures:

$$\cos \lambda = \frac{y_0}{r_0} = y_0 \text{ for } r_0 = 1.$$

$$\cos \mu = y_0 \cos \nu + x_0 \sin \nu.$$

TRANSFORMATION OF THE ELEMENTS

1. *Relations of polar and linear axes.* The fundamental equation relating the polar axes (normal to the three pinacoids)

and the linear axes (parallel to edges of the pinacoidal body) is as follows:

$$a : b : c :: \frac{\sin \alpha}{p_0} : \frac{\sin \beta}{q_0} : \frac{\sin \gamma}{r_0} :: \frac{\sin \lambda}{p_0} : \frac{\sin \mu}{q_0} : \frac{\sin \nu}{r_0}$$

Substitution in this ratio of the known values (for any system, remembering that $\sin 90^\circ = 1$) gives a triple ratio which, solved in two operations, yields the desired transformation. In the case of the triclinic system b and r_0 are taken as unity. To find a and c , given p_0 and q_0 ,

$$a : 1 : c :: \frac{\sin \lambda}{p_0} : \frac{\sin \mu}{q_0} : \frac{\sin \nu}{1}.$$

$$a : 1 = \frac{\sin \lambda}{p_0} : \frac{\sin \mu}{q_0} \quad a = \frac{q_0 \sin \lambda}{p_0 \sin \mu}$$

$$1 : c = \frac{\sin \mu}{q_0} : \frac{\sin \nu}{1} \quad c = \frac{q_0 \sin \nu}{\sin \mu}$$

Similarly, given a and c , to find p_0 and q_0 , we use the middle member of the fundamental ratio and obtain:

$$p_0 = \frac{c \sin \alpha}{a \sin \gamma} \quad q_0 = \frac{c \sin \beta}{\sin \gamma}$$

2. *Relations of the polar and linear axial angles.* If the three angles λ , μ , and ν be regarded as the sides of a spherical triangle, then the supplements of the three angles α , β , and γ are equal to the opposite angles of the triangle. The reverse is also true, the relation being reciprocal. The calculation of either set from the other resolves itself therefore into the calculation of the angles of an oblique spherical triangle whose sides are given.

Given λ , μ , ν and let $\sigma = \frac{\lambda + \mu + \nu}{2}$

$$\sin \frac{\alpha}{2} = \sqrt{\frac{\sin \sigma \sin (\sigma - \lambda)}{\sin \mu \sin \nu}}$$

$$\sin \frac{\beta}{2} = \sqrt{\frac{\sin \sigma \sin (\sigma - \mu)}{\sin \nu \sin \lambda}}$$

$$\sin \frac{\gamma}{2} = \sqrt{\frac{\sin \sigma \sin (\sigma - \nu)}{\sin \lambda \sin \mu}}$$

For the reverse case the formulas are identical but λ , μ , and ν are substituted for α , β , and γ respectively thruout and *vice versa*.

These fundamental relations are deduced and proved by Goldschmidt in *Index der Krystallformen*, pages 5-9. They form the foundation of his whole system of crystallographic discussion, and it is hoped that they may some day be adequately presented to American readers.

CALCULATION OF ANGLES FROM ELEMENTS

The following relations may be derived from the diagram of figure 40.

$$\tan \varphi = \frac{x}{y} = \frac{x_0 + pp_0 \sin \nu}{y_0 + qq_0 + pp_0 \cos \nu} \quad \tan \rho = \frac{x}{h \sin \varphi} = \frac{y}{h \cos \varphi}$$

$$\text{For a prism } \infty \frac{q}{p}, \tan \varphi = \frac{pp_0 \sin \nu}{qq_0 + pp_0 \cos \nu}; \rho = 90^\circ$$

Forms for the most rapid carrying out of the somewhat laborious computations, with adequate controls, will be found in *Winkeltabellen*, pages 19b and 20.

CALCULATION IN THE TRICLINIC SYSTEM, ILLUSTRATED BY ANORTHITE.

A. L. PARSONS

University of Toronto

The methods involved in the complex problem of measuring and calculating the axial ratios of a triclinic crystal are illustrated by the following measurements and calculations of a crystal of anorthite from Vesuvius, made by the writer in the laboratory of Professor Victor Goldschmidt in 1909.

The crystal was slightly elongated but there was no cleavage apparent to guide in orienting it, so that the zone with the longest edges was assumed to be the prism zone, and the crystal was adjusted on the goniometer with this zone parallel to the axis of the vertical circle. Readings were obtained from 19 faces as shown in Table 1.

From these readings a gnomonic projection was made (Fig. 42), from which it is at once evident that this crystal is a simple

individual and not a twin. By measuring the angles between the faces in the principal zones it was found that faces 15, 5, 4, 11, 12 and 18 were in the prism zone. For the purpose of identifying the forms present on the crystal it was only necessary to find the angle-point of each zone, and to measure the angles between the normals to the faces represented by the points in the projection, as shown for the prism zone (Fig. 42). By this means it was also found that face 17 was the base (001)—on the negative end of the crystal, using the standard orientation—thus necessitating an adjustment of the values of σ for the various faces on account of the inverted position of the crystal.

For purposes of calculation two methods of procedure were available: transposing the projection to a plane parallel with the normals to the prismatic zone, or readjusting the crystal so that the edges in the prism zone were parallel with the axis of the vertical circle, and remeasuring the crystal. The latter method was adopted, as there are fewer sources of error in the final calculation. For convenience the prismatic faces were kept separate from the terminal faces. The results of the second measurement are shown in tables 2 and 3.

TABLE 1. ANORTHITE.
PRELIMINARY MEAS-
UREMENTS

No.	V	H $H_0=70^\circ$	$\rho=H-H_0$
14	300°51'	159°55'	89°55'
17	347 33	159 55	89 55
16	30 13	159 54	89 54
15	73 21	159 56	89 56
13	120 43	159 58	89 58
19	167 30	160 00	90 00
18	253 24	159 56	89 56
7	346 41	125 10	55 10
10	23 34	116 13	46 13
6	66 22	121 54	51 54
5	88 04	132 30	62 30
4	113 15	107 08	37 08
9	168 32	118 35	48 35
11	218 22	110 12	40 12
12	239 22	133 19	63 19
8	260 20	122 15	52 15
3	306 24	114 55	44 55
2	266 52	103 33	33 33
1	342 01	79 08	9 08

TABLE 2. ANORTHITE. PRISM ZONE
MEASUREMENTS.

$H_0=70^\circ$. $V_0=71^\circ 57'$

No.	Symbol	V	H	$V-V_0$ $=V'=\varphi$	$\rho=$ $H-H_0$
18	M	0^∞	288°02'	159°58'	359°59'
12	f	$\infty 3$	258 04	159 58	330 01
11	l	∞	229 57	159 58	301 54
4	T	$\infty \overline{1}$	170 27	159 58	242 24
5	z	$\infty \overline{3}$	138 57	159 59	210 54
15	M	0^∞	108 05	159 56	180 02
21	f	$\infty 3$	78 40	159 55	150 37
22	l	∞	50 06	159 52	122 03
23	T	$\infty \overline{1}$	350 35	159 54	62 32
24	z	$\infty \overline{3}$	319 00	158 54	30 57

TABLE 3. ANORTHITE.
Terminal Face Measurements and Calculation of x' and y' .
 $H_0 = 70^\circ$ $V_0 = 71^\circ 57'$

No.	Symbol	V	H	$V - V_0$ $= V' = \varphi'$	$H - H_0$ $= \rho$	$\log \sin \varphi$ $\log \tan \rho$ $\log \cos \varphi$	$\log x'$ $\log y'$	x' y'
8	v $\bar{2} \bar{4}$	255°06'	139°20'	327°03'	69°20'	973 552 042 342 992 384	015 894 034 726	$\bar{1}.4419$ $\bar{2}.2247$
2	u $\bar{2} \bar{2}$	235 42	131 20	307 39	61 20	989 859 026 223 978 592	016 082 004 815	$\bar{1}.4482$ $\bar{1}.1173$
3	o $\bar{1} \bar{1}$	245 32	105 14	317 29	35 14	982 982 984 899 986 752	967 881 971 651	$\bar{5}.4773$ $\bar{5}.5206$
6	w $\bar{2} \bar{4}$	141 21	139 07	213 18	69 07	973 959 041 847 992 211	015 806 034 058	$\bar{1}.439$ $\bar{2}.1907$
10	p $\bar{1} \bar{1}$	147 19	107 00	219 16	37 00	980 136 987 711 988 886	967 847 976 597	$\bar{5}.4796$ 0.5834
7	q $\bar{2} \bar{3} 0$	181 04	79 17	253 01	9 17	998 063 921 341 946 552	919 404 867 893	$\bar{5}.1563$ 0.04775
17	P 0	27 21	96 12	99 18	26 12	999 425 969 202 920 845	968 627 890 047	0.4856 0.07952
14	n $0 \bar{2}$	313 19	118 37	25 16	48 37	963 026 005 497 995 633	968 523 001 130	0.4844 $\bar{1}.0264$
16	e 0 2	85 49	121 57	157 46	51 57	957 793 010 641 996 645	968 434 007 286	0.4834 1.1826
1	y $\bar{2} 0$	198 14	124 56	270 11	54 56	000 000 015 370 750 512	015 370 765 882	$\bar{1}.4246$ 0.0045
27	t 2 0	19 14	140 38	91 11	70 38	999 991 045 407 831 495	045 398 876 902	2.8443 0.05875

The polar position of the instrument h_0 was 70° . Subtracting this value from each H reading we obtain the angle ρ of each face. Plotting the faces by means of the angles V and ρ , we obtain the gnomonic projection of figure 43 which permits a graphical determination of the forms and elements. In order to determine them mathematically it was necessary to have the face 010 (0^∞) at zero on the vertical circle; or to subtract a value from the vertical circle readings which would give the

value 0 for this face and corresponding values for the other faces. The latter plan was followed and the amount to be subtracted was called v_0 .

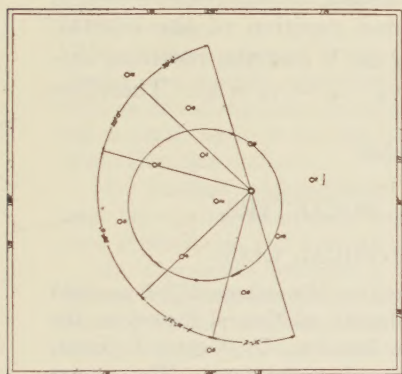


FIG. 42

Gnomonic projections of anorthite crystal (Parsons, p. 187).
Preliminary.

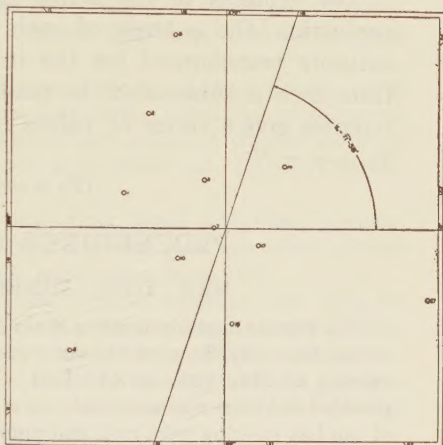


FIG. 43

Final.

DETERMINATION OF v_0

This calculation may be made in three ways:

- (1) By means of the projection and the *Winkeltabellen*.
- (2) By means of the angles of the terminal faces.
- (3) By means of the angles of the prism faces.

TABLE 4. CALCULATION OF v_0 FROM PROJECTION AND WINKELTABELLEN

No.	Symbol	s	V	$V-(\varphi')$	V_0	No.	Symbol	s	V	$V-(\varphi')$	V_0
16	e	02	85°49'	157°41'	71°52'	24	z	$\infty \frac{3}{2}$	319°00'	390°58'	71°58'
15	M	0 8	108 05	180 00	71 55	8	v	$\frac{24}{22}$	255 06	327 03	71 57
18	M	0 8	288 02	360	71 58	2	u	$\frac{22}{22}$	235 42	307 51	72 09
10	p	11	147 19	219 16	71 57	3	o	$\frac{11}{11}$	245 32	317 25	71 53
12	f	$\infty 3$	258 04	330 31	[72 27]	6	w	$\frac{24}{24}$	141 21	213 21	72 00
11	l	$\infty 3$	229 57	301 56	71 59	7	q	$\frac{20}{3}$	181 04	252 47	71 43
4	T	$\infty 3$	170 27	242 27	72 00						
5	z	$\infty \frac{3}{3}$	138 57	210 58	72 01	17	P	0	27 21	99 27	72 06
21	f	$\infty 3$	78 40	150 31	71 51	14	n	02	313 19	385 27	72 08
22	l	$\infty 3$	50 06	121 56	71 50	1	y	20	198 14	269 20	[71 06]
23	T	$\infty 3$	350 35	422 27	71 52	27	t	20	19 14	94 14	[75 00]

Omitting 12, 1 and 27:—Average $v_0 = 71^\circ 57' - 1/9'$

1. *Determination of v_0 by the use of the angles of the Winkeltabellen.* Figures 39 and 43 and Table 4

The symbols of the forms having been determined in the projection, the φ angle of each is found in the *Winkeltabellen*, suitably transformed for the inverted position of the crystal; from each is subtracted the reading on V and the resulting differences give a series of values of v_0 . $V - v_0 = \varphi$. Therefore $v_0 = \varphi - V$.

(To be concluded)

PROCEEDINGS OF SOCIETIES.

NEW YORK MINERALOGICAL CLUB

The regular monthly meeting of the New York Mineralogical Club was held in the Assembly Room of the American Museum of Natural History on the evening of May 19th, at 8.15 P.M. The President, Dr. George F. Kunz, presided and there was an attendance of 35 members and guests. The minutes of the last meeting were read and approved. On a suggestion by the Chair the report of the Committee on change of name was deferred.

Mr. Roy M. Allen read a paper on "Polarized Light and Its Application to the Study of Crystal Structure." In the course of his paper Mr. Allen took up the explanation of polarized light by analogies, explaining the nature of light and how it is transmitted thru crystalline structures. He took up the vibratory theory of light and pointed out the difference between ordinary light and polarized light. Using a diagram of a Nicol prism he illustrated the phenomena of refraction, reflection and absorption of light. By means of a blackboard demonstration he illustrated the molecular structure of crystalline bodies and showed how polarized light transmitted thru them produced the various effects which are used in determining minerals in thin section under the polarizing microscope.

In the second half of the program, Mr. George E. Ashby, using the polarizing microscope attached to the lantern, showed upon the screen a number of striking illustrations of the behavior of minerals in polarized light. After this exhibition a vote of thanks was tendered to Messrs Allen and Ashby.

Taking up the subject of the Decoration Day Excursion, Mr. Oppenheimer and Mr. Broadwell spoke of the Bronx locality at Burke Avenue as a possible objective. After some discussion this was adopted.

The New York Mineralogical Club and the Newark Mineralogical Society met for a joint field excursion on Decoration Day, May 31st, at the Lexington Avenue Subway Station at 180th Street, and proceeded to the recently opened locality at Burke Avenue, Bronx. Among the Club members attending this Field Excursion were: Miss Catherine Schroder, Messrs. George F. Black, W. H. Broadwell, Louis W. Dunham, Charles Francesconi, J. A. Grenzig, John Holzman, H. M. Lehman, Frank D. Tansley, George S. Scott, E. H. Wilson, J. P. Wintringham and H. P. Whitlock. Practically all the species reported from this locality were encountered and several members secured notable examples:

HERBERT P. WHITLOCK, *Recording Secretary*

PHILADELPHIA MINERALOGICAL SOCIETY

Wagner Free Institute of Science, September 9, 1920

A stated meeting of the Philadelphia Mineralogical Society was held on the above date with the vice-president, Mr. Trudell, in the chair. Thirteen members were present. Reports of summer trips constituted the program of the evening.

Mr. Gordon reported a trip to Brinton's quarry, Chester County, with Messrs. Frankenfield and Trudell, on June 20th. Specimens of *colerainite* from an albite pegmatite in the serpentine were exhibited, the first report of this mineral outside of the type localities, in the Black Lake District, Canada; it was identified optically.

Mr. Warford exhibited beryl crystals from Broad and Olney Avenue, large brown titanite crystals from O'Neill's quarry; pink microcline crystals from Holmesburg, and limonite pseudo pyrite from Camp Hill.

Mr. Biernbaum described a trip thru Virginia taken on July 3-10, by Messrs. Frankenfield, Gordon, and himself. The itinerary included Amelia, Natural Bridge, Midvale, Irish Creek, and Luray. Albite, amazonstone, columbite, microlite, and topaz were obtained at Amelia; dufrenite, strengite and pyrolusite at Midvale; arsenopyrite, and minute crystals of cassiterite and scheelite at the Irish Creek tin mines.

Mr. Gordon described a collecting trip thru Pennsylvania, which included localities in Chester, Lancaster, Cumberland, Huntingdon, Perry, Franklin, Lebanon, and Berks counties. A search thru Franklin County for the source of small pyrite diploids occurring in a black limestone, which had been received by the Academy, proved unsuccessful. Andradite crystals were obtained at Cornwall; beraunite and wavellite at Moore's Mill; and stilbite at Robeson.

Mr. Ford reported a trip to the French Creek mines with Mr. Oldach on August 21. Groups of brilliant magnetite crystals, combinations of (111) and (110), individual crystals of which measured 2 cm.; and pyrite crystals, combinations of (210) and (111) in equal development, were obtained.

Mr. Trudell presented an account of the trip of the society to the French Creek mines on September 4 to 6th; attended by Messrs. Frankenfield, Ford, Oldach, Gordon, Warford, and himself.

Mr. Ford exhibited strueverite, ampingabeite, betafite, columbite, euxenite, monazite, and spodumene, from Madagascar.

The death of Mr. Benjamin Smith Lyman, an honorary member, was announced.

The following nominations were made for officers for 1920-1921:

President: Dr. Alfred C. Hawkins

Vice-President: Mr. Harry W. Trudell

Treasurer: Mr. Harry A. Warford

Secretary: Mr. Samuel G. Gordon.

The society then adjourned for an examination of the specimens.

SAMUEL G. GORDON, *Secretary*

NOTES AND NEWS

UNUSUAL MINERALS IN LIMESTONE NEAR YORK, PA. MORTON L. JANDORF. *York, Pa.*—The Cambro-Ordovician limestones of the York Valley are as a rule free from minerals of the heavy metals, but in one narrow stratum exposed about 5 meters down in a new quarry near the city the writer has recently observed small amounts of sphalerite, associated with a series of alteration products provisionally identified as greenockite (xanthochroite), smithsonite, aurichalcite and hydrozincite. Galenite appears to be entirely absent. The dolomite is siliceous, and shows occasionally thin quartz seams. Cavities in it may contain minute dolomite and quartz crystals, tufts of aurichalcite, and occasionally pyritohedral crystals of pyrite altered to limonite. Cavities with 60° angles are sometimes observed, which evidently represent the result of the dissolving away of sphalerite crystals, without any replacement.

It has been possible to trace this stratum for a distance of over 250 meters. At the surface there is no indication of contact phenomena with any igneous rocks, although about 1 km. away there is a diabase dike. None of the contact minerals usually developed in dolomite-limestone by the action of diabase are, however, in evidence.

The amounts of metallic minerals present are apparently too small for the material to be of value as an ore, but the occurrence has considerable scientific importance, and the writer will be glad to exchange specimens with anyone interested.

Mr. Thomas Lloyd Gledhill, M.A. (Univ. of Toronto), has been appointed instructor in Mineralogy and Geology at Northwestern University.

THE COLORS OF MINERALS, PARTICULARLY PRECIOUS STONES. DR. C. DOELTER. 96 pages. Friedr. Vieweg & Sohn, Braunschweig, Germany. 1915 [Prior notice prevented by inability to obtain it in this country].

An excellent summary of our knowledge of the subject. About 60 minerals are discussed, and the inorganic origin of the colors of most of them demonstrated. The methods of study of the causes of color are presented at some length, altho there is no adequate discussion of absorption spectra. Luminescence is, however, fully treated. The greatest attention is paid to the action of radium rays, and the many remarkable colorations produced by them are described in detail.

E. T. W.

According to literature received from a company now selling stock, the mineral amphibole, "the great new wealth" (by which they mean amphibole asbestos), is about to be turned into wealth for its stockholders. The chief uses proposed are as a permanent mold in which to cast metals, as furnace lining, as pipe-covering, as electrical insulation, etc. They claim to control large deposits of this mineral in a region "rich in rubies, sapphires, carborundum, and other old volcanic products" (!)